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THE ULTIMATE CONSTITUENTS OF MATTER.*

I WISH to discuss in this article no less a question than the ancient metaphysical query, "What is matter?" The question, "What is matter?" in so far as it concerns philosophy, is, I think, already capable of an answer which in principle will be as complete as an answer can hope to be; that is to say, we can separate the problem into an essentially soluble and an essentially insoluble portion, and we can now see how to solve the essentially soluble portion, at least as regards its main outlines. It is these outlines which I wish to suggest in the present article. My main position, which is realistic, is, I hope and believe, not remote from that of Professor Alexander, by whose writings on this subject I have profited greatly.¹ It is also in close accord with that of Dr. Nunn.²

Common sense is accustomed to the division of the world into mind and matter. It is supposed by all who have never studied philosophy that the distinction between mind and matter is perfectly clear and easy, that the two do not at any point overlap, and that only a fool or a philosopher could be in doubt as to whether any given entity is mental or material. This simple faith survives in Descartes and in a somewhat modified form in Spinoza, but with Leibniz it begins to disappear, and from his day to our own almost every philosopher of note has criticized and rejected the dualism of common sense. It is my intention in this article to defend this dualism; but before defending

* An address delivered to the Philosophical Society of Manchester in February 1915.

¹ Cf. especially Samuel Alexander, "The Basis of Realism," *British Academy*, Vol. VI.

² "Are Secondary Qualities Independent of Perception?" *Proc. Arist. Soc.*, 1909-10, pp. 151-218.

it we must spend a few moments on the reasons which have prompted its rejection.

Our knowledge of the material world is obtained by means of the senses, of sight and touch and so on. At first it is supposed that things are just as they seem, but two opposite sophistications soon destroy this naive belief. On the one hand the physicists cut up matter into molecules, atoms, corpuscles, and as many more such subdivisions as their future needs may make them postulate, and the units at which they arrive are uncommonly different from the visible, tangible objects of daily life. A unit of matter tends more and more to be something like an electromagnetic field filling all space, though having its greatest intensity in a small region. Matter consisting of such elements is as remote from daily life as any metaphysical theory. It differs from the theories of metaphysicians only in the fact that its practical efficacy proves that it contains some measure of truth and induces business men to invest money on the strength of it; but in spite of its connection with the money market, it remains a metaphysical theory none the less.

The second kind of sophistication to which the world of common sense has been subjected is derived from the psychologists and physiologists. The physiologists point out that what we see depends upon the eye, that what we hear depends upon the ear, and that all our senses are liable to be affected by anything which affects the brain, like alcohol or hasheesh. Psychologists point out how much of what we think we see is supplied by association or unconscious inference, how much is mental interpretation, and how doubtful is the residuum which can be regarded as crude datum. From these facts it is argued by the psychologists that the notion of a datum passively received by the mind is a delusion, and it is argued by the physiologists that even if a pure datum of sense could be obtained by

the analysis of experience, still this datum could not belong, as common sense supposes, to the outer world, since its whole nature is conditioned by our nerves and sense organs, changing as they change in ways which it is thought impossible to connect with any change in the matter supposed to be perceived. This physiologist's argument is exposed to the rejoinder, more specious than solid, that our knowledge of the existence of the sense organs and nerves is obtained by that very process which the physiologist has been engaged in discrediting, since the existence of the nerves and sense organs is only known through the evidence of the senses themselves. This argument may prove that some reinterpretation of the results of physiology is necessary before they can acquire metaphysical validity. But it does not upset the physiological argument in so far as this constitutes merely a *reductio ad absurdum* of naive realism.

These various lines of argument prove, I think, that some part of the beliefs of common sense must be abandoned. They prove that, if we take these beliefs as a whole, we are forced into conclusions which are in part self-contradictory; but such arguments cannot of themselves decide what portion of our common-sense beliefs is in need of correction. Common sense believes that what we see is physical, outside the mind, and continuing to exist if we shut our eyes or turn them in another direction. I believe that common sense is right in regarding what we see as physical and outside the mind, but is probably wrong in supposing that it continues to exist when we are no longer looking at it. It seems to me that the whole discussion of matter has been obscured by two errors which support each other. The first of these is the error that what we see, or perceive through any of our other senses, is subjective: the second is the belief that what is physical must be persistent. Whatever physics may regard as the ultimate

constituents of matter, it always supposes these constituents to be indestructible. Since the immediate data of sense are not indestructible but in a state of perpetual flux, it is argued that these data themselves cannot be among the ultimate constituents of matter. I believe this to be a sheer mistake. The persistent particles of mathematical physics I regard as logical constructions, symbolic fictions enabling us to express compendiously very complicated assemblages of facts; and, on the other hand, I believe that the actual data in sensation, the immediate objects of sight or touch or hearing, are extra-mental, purely physical, and among the ultimate constituents of matter.

My meaning in regard to the impermanence of physical entities may perhaps be made clearer by the use of Bergson's favorite illustration of the cinematograph. When I first read Bergson's statement that the mathematician conceives the world after the analogy of a cinematograph, I had never seen a cinematograph, and my first visit to one was determined by the desire to verify Bergson's statement, which I found to be completely true, at least so far as I am concerned. When, in a picture palace, we see a man rolling down hill, or running away from the police, or falling into a river, or doing any of those other things to which men in such places are addicted, we know that there is not really only one man moving, but a succession of films, each with a different momentary man. The illusion of persistence arises only through the approach to continuity in the series of momentary men. Now what I wish to suggest is that in this respect the cinema is a better metaphysician than common sense, physics, or philosophy. The real man too, I believe, however the police may swear to his identity, is really a series of momentary men, each different one from the other, and bound together, not by a numerical identity, but by continuity and certain intrinsic causal laws. And what applies to men applies

equally to tables and chairs, the sun, moon and stars. Each of these is to be regarded, not as one single persistent entity, but as a series of entities succeeding each other in time, each lasting for a very brief period, though probably not for a mere mathematical instant. In saying this I am only urging the same kind of division in time as we are accustomed to acknowledge in the case of space. A body which fills a cubic foot will be admitted to consist of many smaller bodies, each occupying only a very tiny volume; similarly a thing which persists for an hour is to be regarded as composed of many things of less duration. A true theory of matter requires a division of things into time-corpuscles as well as into space-corpuscles.

The world may be conceived as consisting of a multitude of entities arranged in a certain pattern. The entities which are arranged I shall call "particulars." The arrangement or pattern results from relations among particulars. Classes or series of particulars, collected together on account of some property which makes it convenient to be able to speak of them as wholes, are what I call logical constructions or symbolic fictions. The particulars are to be conceived, not on the analogy of bricks in a building, but rather on the analogy of notes in a symphony. The ultimate constituents of a symphony (apart from relations) are the notes, each of which lasts only for a very short time. We may collect together all the notes played by one instrument: these may be regarded as the analogues of the successive particulars which common sense would regard as successive states of one "thing." But the "thing" ought to be regarded as no more "real" or "substantial" than, for example, the rôle of the trombone. As soon as "things" are conceived in this manner it will be found that the difficulties in the way of regarding immediate objects of sense as physical have largely disappeared.

When people ask, "Is the object of sense mental or physical?" they seldom have any clear idea either what is meant by "mental" or "physical," or what criteria are to be applied for deciding whether a given entity belongs to one class or the other. I do not know how to give a sharp definition of the word "mental," but something may be done by enumerating occurrences which are indubitably mental: believing, doubting, wishing, willing, being pleased or pained, are certainly mental occurrences; so are what we may call experiences, seeing, hearing, smelling, perceiving generally. But it does not follow from this that what is seen, what is heard, what is smelt, what is perceived, must be mental. When I see a flash of lightning, my seeing of it is mental, but what I see, although it is not quite the same as what anybody else sees at the same moment, and although it seems very unlike what the physicist would describe as a flash of lightning, is not mental. I maintain, in fact, that if the physicist could describe truly and fully all that occurs in the physical world when there is a flash of lightning, it would contain as a constituent what I see, and also what is seen by anybody else who would commonly be said to see the same flash. What I mean may perhaps be made plainer by saying that if my body could remain in exactly the same state in which it is, although my mind had ceased to exist, precisely that object which I now see when I see the flash would exist, although of course I should not see it, since my seeing is mental. The principal reasons which have led people to reject this view have, I think, been two: first, that they did not adequately distinguish between my seeing and what I see; secondly, that the causal dependence of what I see upon my body has made people suppose that what I see cannot be "outside" me. The first of these reasons need not detain us, since the confusion only needs to be pointed out in order to be obviated; but the second requires some discussion, since it

can only be answered by removing current misconceptions, on the one hand as to the nature of space, and on the other, as to the meaning of causal dependence.

When people ask whether colors, for example, or other secondary qualities are inside or outside the mind, they seem to suppose that their meaning must be clear, and that it ought to be possible to say yes or no without any further discussion of the terms involved. In fact, however, such terms as "inside" or "outside" are very ambiguous. What is meant by asking whether this or that is "in" the mind? The mind is not like a bag or a pie; it does not occupy a certain region in space, or, if it does, what is in that region is presumably part of the brain, which would not be said to be in the mind. When people say that sensible qualities are in the mind, they do not mean "spatially contained in" in the sense in which the blackbirds were in the pie. We might regard the mind as an assemblage of particulars, namely what would be called "states of mind," which would belong together in virtue of some specific common quality. The common quality of all states of mind would be the quality designated by the word "mental"; and besides this we should have to suppose that each separate person's states of mind have some common characteristic distinguishing them from the states of mind of other people. Ignoring this latter point, let us ask ourselves whether the quality designated by the word "mental" does, as a matter of observation, actually belong to objects of sense, such as colors or noises. I think any candid person must reply that, however difficult it may be to know what we mean by "mental," it is not difficult to see that colors and noises are not mental in the sense of having that intrinsic peculiarity which belongs to beliefs and wishes and volitions, but not to the physical world. Berkeley advances on this subject a plausible argument³ which seems to me to rest upon

³First dialogue between Hylas and Philonous, *Works* (Fraser's edition), I, p. 266; *Three Dialogues* (published by Open Court Pub. Co.), p. 15.

an ambiguity in the word "pain." He argues that the realist supposes the heat which he feels in approaching a fire to be something outside his mind, but that as he approaches nearer and nearer to the fire the sensation of heat passes imperceptibly into pain, and that no one could regard pain as something outside the mind. In reply to this argument, it should be observed in the first place that the heat of which we are immediately aware is not in the fire but in our own body. It is only by inference that the fire is judged to be the cause of the heat which we feel in our body. In the second place (and this is the more important point), when we speak of pain we may mean one of two things: we may mean the object of the sensation or other experience which has the quality of being painful, or we may mean the quality of painfulness itself. When a man says he has a pain in his great toe, what he means is that he has a sensation associated with his great toe and having the quality of painfulness. The sensation itself, like every sensation, consists in experiencing a sensible object, and the experiencing has that quality of painfulness which only mental occurrences can have, but which may belong to thoughts or desires, as well as to sensations. But in common language we speak of the sensible object experienced in a painful sensation as a pain, and it is this way of speaking which causes the confusion upon which the plausibility of Berkeley's argument depends. It would be absurd to attribute the quality of painfulness to anything non-mental, and hence it comes to be thought that what we call a pain in the toe must be mental. In fact, however, it is not the sensible object in such a case which is painful, but the sensation, that is to say, the experience of the sensible object. As the heat which we experience from the fire grows greater, the experience passes gradually from being pleasant to being painful, but neither the pleasure nor the pain is a quality of the object experienced

as opposed to the experience, and it is therefore a fallacy to argue that this object must be mental on the ground that painfulness can only be attributed to what is mental.

If, then, when we say that something is in the mind we mean that it has a certain recognizable intrinsic characteristic such as belongs to thoughts and desires, it must be maintained on grounds of immediate inspection that objects of sense are not in any mind.

A different meaning of "in the mind" is however to be inferred from the arguments advanced by those who regard sensible objects as being in the mind. The arguments used are, in the main, such as would prove the causal dependence of objects of sense upon the percipient. Now the notion of causal dependence is very obscure and difficult, much more so in fact than is generally realized by philosophers. I shall return to this point in a moment. For the present however, accepting the notion of causal dependence without criticism, I wish to urge that the dependence in question is rather upon our bodies than upon our minds. The visual appearance of an object is altered if we shut one eye, or squint, or look previously at something dazzling; but all these are bodily acts, and the alterations which they effect are to be explained by physiology and optics, not by psychology.⁴ They are in fact of exactly the same kind as the alterations effected by spectacles or a microscope. They belong therefore to the theory of the physical world, and can have no bearing upon the question whether what we see is causally dependent upon the mind. What they do tend to prove, and what I for my part have no wish to deny, is that what we see is causally dependent upon our body and is not, as crude common sense would suppose, something which would exist equally if our eyes and nerves and brain were absent, any more than the visual appearance presented by an object seen through a microscope would re-

⁴ This point has been well urged by the American realists.

main if the microscope were removed. So long as it is supposed that the physical world is composed of stable and more or less permanent constituents, the fact that what we see is changed by changes in our body appears to afford reason for regarding what we see as not an ultimate constituent of matter. But if it is recognized that the ultimate constituents of matter are as circumscribed in duration as in spatial extent, the whole of this difficulty vanishes.

There remains however another difficulty, connected with space. When we look at the sun we wish to know something about the sun itself, which is ninety-three million miles away; but what we see is dependent upon our eyes, and it is difficult to suppose that our eyes can affect what happens at a distance of ninety-three million miles. Physics tells us that certain electromagnetic waves start from the sun, and reach our eyes after about eight minutes. They there produce disturbances in the rods and cones, thence in the optic nerve, thence in the brain. At the end of this purely physical series, by some odd miracle, comes the experience which we call "seeing the sun," and it is such experiences which form the whole and sole reason for our belief in the optic nerve, the rods and cones, the ninety-three million miles, the electromagnetic waves, and the sun itself. It is this curious oppositeness of direction between the order of causation as affirmed by physics, and the order of evidence as revealed by theory of knowledge, that causes the most serious perplexities in regard to the nature of physical reality. Anything that invalidates our seeing, as a source of knowledge concerning physical reality, invalidates also the whole of physics and physiology. And yet, starting from a common-sense acceptance of our seeing, physics has been led step by step to the construction of the causal chain in which our seeing is the last link, and the immediate object which we see cannot be regarded as

that initial cause which we believe to be ninety-three million miles away, and which we are inclined to regard as the "real" sun.

I have stated this difficulty as forcibly as I can, because I believe that it can only be answered by a radical analysis and reconstruction of all the conceptions upon whose employment it depends.

Space, time, matter and cause, are the chief of these conceptions. Let us begin with the conception of cause.

Causal dependence, as I observed a moment ago, is a conception which it is very dangerous to accept at its face value. There exists a notion that in regard to any event there is something which may be called *the* cause of that event—some one definite occurrence, without which the event would have been impossible and with which it becomes necessary. An event is supposed to be dependent upon its cause in some way in which it is not dependent upon other things. Thus men will urge that the mind is dependent upon the brain, or, with equal plausibility, that the brain is dependent upon the mind. It seems not improbable that if we had sufficient knowledge we could infer the state of a man's mind from the state of his brain, or the state of his brain from the state of his mind. So long as the usual conception of causal dependence is retained, this state of affairs can be used by the materialist to urge that the state of our brain causes our thoughts, and by the idealist to urge that our thoughts cause the state of our brain. Either contention is equally valid or equally invalid. The fact seems to be that there are many correlations of the sort which may be called causal, and that, for example, either a physical or a mental event can be predicted, theoretically, either from a sufficient number of physical antecedents or from a sufficient number of mental antecedents. To speak of *the* cause of an event is therefore misleading. Any set of antecedents from which

the event can theoretically be inferred by means of correlations might be called *a* cause of the event. But to speak of *the* cause is to imply a uniqueness which does not exist.

The relevance of this to the experience which we call "seeing the sun" is obvious. The fact that there exists a chain of antecedents which makes our seeing dependent upon the eyes and nerves and brain does not even tend to show that there is not another chain of antecedents in which the eyes and nerves and brain as physical things are ignored. If we are to escape from the dilemma which seemed to arise out of the physiological causation of what we see when we say we see the sun, we must find, at least in theory, a way of stating causal laws for the physical world, in which the units are not material things, such as the eyes and nerves and brain, but momentary particulars of the same sort as our momentary visual object when we look at the sun. The sun itself and the eyes and nerves and brain must be regarded as assemblages of momentary particulars. Instead of supposing, as we naturally do when we start from an uncritical acceptance of the apparent dicta of physics, that *matter* is what is "really real" in the physical world, and that the immediate objects of sense are mere phantasms, we must, instead, regard matter as a logical construction, of which the constituents will be just such evanescent particulars as may, when an observer happens to be present, become data of sense to that observer. What physics regards as the sun of eight minutes ago will be a whole assemblage of particulars, existing at different times, spreading out from a center with the velocity of light, and containing among their number all those visual data which are seen by people who are now looking at the sun. Thus the sun of eight minutes ago is a class of particulars, and what I see when I now look at the sun is one member of this class. The various particulars constituting this class will be correlated with each other by a

certain continuity and certain intrinsic laws of variation as we pass outwards from the center, together with certain modifications correlated extrinsically with other particulars which are not members of this class. It is these extrinsic modifications which represent the sort of facts that, in our former account, appeared as the influence of the eyes and nerves in modifying the appearance of the sun.⁵

The *prima facie* difficulties in the way of this view are chiefly derived from an unduly conventional theory of space. It might seem at first sight as if we had packed the world much fuller than it could possibly hold. At every place between us and the sun, we said, there is to be a particular which is to be a member of the sun as it was a few minutes ago. There will also, of course, have to be a particular which is a member of any planet or fixed star that may happen to be visible from that place. At the place where I am, there will be particulars which will be members severally of all the "things" I am now said to be perceiving. Thus throughout the world, everywhere, there will be an enormous number of particulars coexisting in the same place. But these troubles result from contenting ourselves too readily with the merely three-dimensional space to which schoolmasters have accustomed us. The space of the real world is a space of six dimensions, and as soon as we realize this we see that there is plenty of room for all the particulars for which we want to find positions. In order to realize this we have only to return for a moment from the polished space of physics to the rough and untidy space of our immediate sensible experience. The space of one man's sensible objects is a three-dimensional space. It does not appear probable that two men ever both perceive at the same time any one sensible object; when they are said to see the same thing

⁵ Cf. T. P. Nunn, "Are Secondary Qualities Independent of Perception?" *Proc. Arist. Soc.*, 1909-1910.

or hear the same noise, there will always be some difference, however slight, between the actual shapes seen or the actual sounds heard. If this is so, and if, as is generally assumed, position in space is purely relative, it follows that the space of one man's objects and the space of another man's objects have no place in common, that they are in fact different spaces, and not merely different parts of one space. I mean by this that such immediate spatial relations as are perceived to hold between the different parts of the sensible space perceived by one man, do not hold between parts of sensible spaces perceived by different men. There are therefore a multitude of three-dimensional spaces in the world: there are all those perceived by observers, and presumably also those which are not perceived, merely because no observer is suitable situated for perceiving them.

But although these spaces do not have to one another the same kind of spatial relations as obtain between the parts of one of them, it is nevertheless possible to arrange these spaces themselves in a three-dimensional order. This is done by means of the correlated particulars which we regard as members (or aspects) of one physical thing. When a number of people are said to see the same object, those who would be said to be near to the object see a particular occupying a larger part of their field of vision than is occupied by the corresponding particular seen by people who would be said to be farther from the thing. By means of such considerations it is possible, in ways which need not now be further specified, to arrange all the different spaces in a three-dimensional series. Since each of the spaces is itself three-dimensional, the whole world of particulars is thus arranged in a six-dimensional space, that is to say, six coordinates will be required to assign completely the position of any given particular, namely three to assign its position in its own space and three more to assign the position of its space among the other spaces.

There are two ways of classifying particulars: we may take together all those that belong to a given "perspective," or all those that are, as common sense would say, different "aspects" of the same "thing." For example, if I am (as is said) seeing the sun, what I see belongs to two assemblages: (1) the assemblage of all my present objects of sense, which is what I call a "perspective"; (2) the assemblage of all the different present particulars which would be called aspects of the sun—this assemblage is what I define as *being* the sun at the present time. Thus "perspectives" and "things" are merely two different ways of classifying particulars. It is to be observed that there is no *a priori* necessity for particulars to be susceptible of this double classification. There may be what might be called "wild" particulars, not having the usual relations by which the classification is effected; perhaps dreams and hallucinations are composed of particulars which are "wild" in this sense.

The exact definition of what is meant by a perspective is not quite easy. So long as we confine ourselves to visible objects or to objects of touch we might define the perspective of a given particular as "all particulars which have a simple (direct) spatial relation to the given particular." Between two patches of color which I see now, there is a direct spatial relation which I equally see. But between patches of color seen by different men there is only an indirect constructed spatial relation by means of the placing of "things" in physical space (which is the same as the space composed of perspectives). Those particulars which have direct spatial relations to a given particular will belong to the same perspective. But if, for example, the sounds which I hear are to belong to the same perspective with the patches of color which I see, there must be particulars which have no direct spatial relation and yet belong to the same perspective. We cannot define a perspective as all the data of one percipient at one time,

because we wish to allow the possibility of perspectives which are not perceived by any one. There will be need, therefore, in defining a perspective, of some principle derived neither from psychology nor from space.

Such a principle may be obtained from the consideration of *time*. The one all-embracing time, like the one all-embracing space, is a construction; there is no *direct* time-relation between particulars belonging to my perspective and particulars belonging to another man's. On the other hand, any two particulars of which I am aware are either simultaneous or successive, and their simultaneity or successiveness is sometimes itself a datum to me. We may therefore define the perspective to which a given particular belongs as "all particulars simultaneous with the given particular," where "simultaneous" is to be understood as a direct simple relation, not the derivative constructed relation of physics. It may be observed that the introduction of "local time" suggested by the principle of relativity has effected, for purely scientific reasons, much the same multiplication of times as we have just been advocating.

The sum-total of all the particulars that are (directly) either simultaneous with or before or after a given particular may be defined as the "biography" to which that particular belongs. It will be observed that, just as a perspective need not be actually perceived by any one, so a biography need not be actually lived by any one. Those biographies that are lived by no one are called "official."

The definition of a "thing" is effected by means of continuity and of correlations which have a certain differential independence of other "things." That is to say, given a particular in one perspective, there will usually in a neighboring perspective be a very similar particular, differing from the given particular, to the first order of small quantities, according to a law involving only the difference

of position of the two perspectives in perspective space, and not any of the other "things" in the universe. It is this continuity and differential independence in the law of change as we pass from one perspective to another that defines the class of particulars which is to be called "one thing."

Broadly speaking, we may say that the physicist finds it convenient to classify particulars into "things," while the psychologist finds it convenient to classify them into "perspectives" and "biographies," since one perspective *may* constitute the momentary data of one percipient, and one biography *may* constitute the whole of the data of one percipient throughout his life.

We may now sum up our discussion. Our object has been to discover as far as possible the nature of the ultimate constituents of the physical world. When I speak of the "physical world" I mean, to begin with, the world dealt with by physics. It is obvious that physics is an empirical science, giving us a certain amount of knowledge and based upon evidence obtained through the senses. But partly through the development of physics itself, partly through arguments derived from physiology, psychology or metaphysics, it has come to be thought that the immediate data of sense could not themselves form part of the ultimate constituents of the physical world, but were in some sense "mental," "in the mind," or "subjective." The grounds for this view, in so far as they depend upon physics, can only be adequately dealt with by rather elaborate constructions depending upon symbolic logic, showing that out of such materials as are provided by the senses it is possible to construct classes and series having the properties which physics assigns to matter. Since this argument is difficult and technical, I have not embarked upon it in this article. But in so far as the view that sense-data are "mental" rests upon physiology, psychology, or metaphysics, I have

tried to show that it rests upon confusions and prejudices—prejudices in favor of permanence in the ultimate constituents of matter, and confusions derived from unduly simple notions as to space, from the causal correlation of sense-data with sense-organs, and from failure to distinguish between sense-data and sensations. If what we have said on these subjects is valid, the existence of sense-data is logically independent of the existence of mind, and is causally dependent upon the *body* of the percipient rather than upon his mind. The causal dependence upon the body of the percipient, we found, is a more complicated matter than it appears to be, and, like all causal dependence, is apt to give rise to erroneous beliefs through misconceptions as to the nature of causal correlation. If we have been right in our contentions, sense-data are merely those among the ultimate constituents of the physical world, of which we happen to be immediately aware; they themselves are purely physical, and all that is mental in connection with them is our awareness of them, which is irrelevant to their nature and to their place in physics.

Unduly simple notions as to space have been a great stumbling-block to realists. When two men look at the same table, it is supposed that what the one sees and what the other sees are in the same place. Since the shape and color are not quite the same for the two men, this raises a difficulty, hastily solved, or rather covered up, by declaring what each sees to be purely “subjective”—though it would puzzle those who use this glib word to say what they mean by it. The truth seems to be that space—and time also—is much more complicated than it would appear to be from the finished structure of physics, and that the one all-embracing three-dimensional space is a logical construction, obtained by means of correlations from a crude space of six dimensions. The particulars occupying this six-dimensional space, classified in one way, form “things,”

from which with certain further manipulations we can obtain what physics can regard as matter ; classified in another way, they form "perspectives" and "biographies," which may, if a suitable percipient happens to exist, form respectively the sense-data of a momentary or of a total experience. It is only when physical "things" have been dissected into series of classes of particulars, as we have done, that the conflict between the point of view of physics and the point of view of psychology can be overcome. This conflict, if what has been said is not mistaken, flows from different methods of classification, and vanishes as soon as its source is discovered.

In favor of the theory which I have briefly outlined, I do not claim that it is *certainly* true. Apart from the likelihood of mistakes, much of it is avowedly hypothetical. What I do claim for the theory is that it *may* be true, and that this is more than can be said for any other theory except the closely analogous theory of Leibniz. The difficulties besetting realism, the confusions obstructing any philosophical account of physics, the dilemma resulting from discrediting sense-data, which yet remain the sole source of our knowledge of the outer world—all these are avoided by the theory which I advocate. This does not prove the theory to be true, since probably many other theories might be invented which would have the same merits. But it does prove that the theory has a better chance of being true than any of its present competitors, and it suggests that what can be known with certainty is likely to be discoverable by taking our theory as a starting-point, and gradually freeing it from all such assumptions as seem irrelevant, unnecessary, or unfounded. On these grounds, I recommend it to attention as a hypothesis and a basis for further work, though not as itself a finished or adequate solution of the problem with which it deals.

CAMBRIDGE, ENGLAND.

BERTRAND RUSSELL.